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100

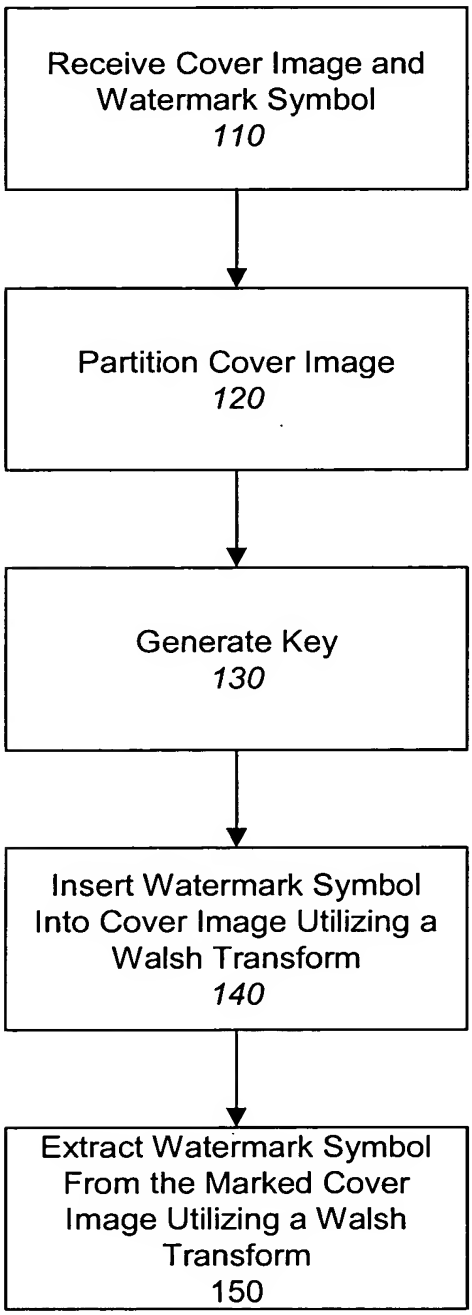
Receive Cover Image and Watermark Symbol
110
Partition Cover Image
120
Generate Key
130
Insert Watermark Symbol Into Cover Image Utilizing a Walsh Transform
140
Extract Watermark Symbol From the Marked Cover Image Utilizing a Walsh Transform
150

Figure 1

200

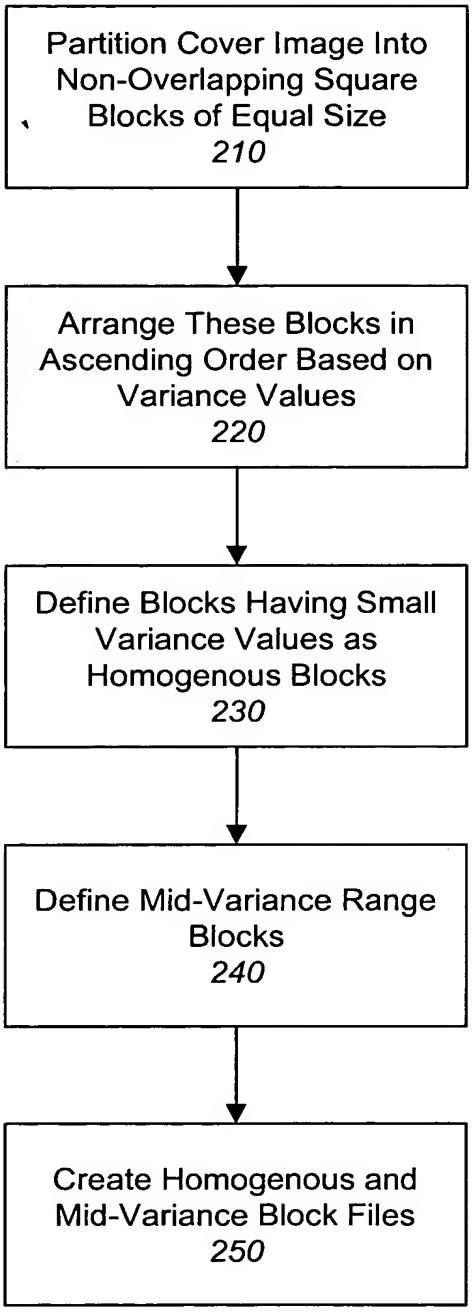
Partition Cover Image Into Non-Overlapping Square Blocks of Equal Size
210
Arrange These Blocks in Ascending Order Based on Variance Values
220
Define Blocks Having Small Variance Values as Homogenous Blocks
230
Define Mid-Variance Range Blocks
240
Create Homogenous and Mid-Variance Block Files
250

Figure 2

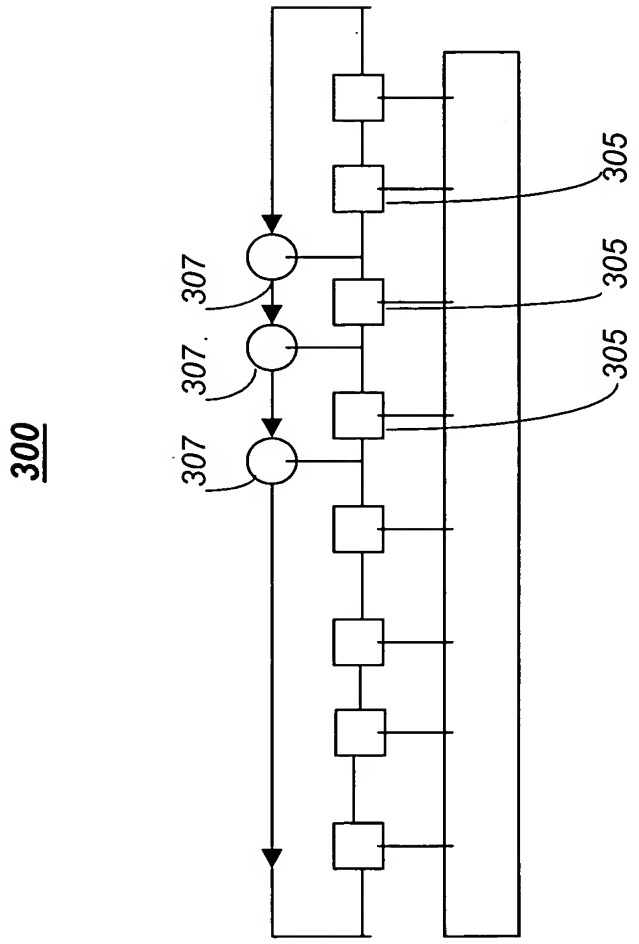

Figure 3

400

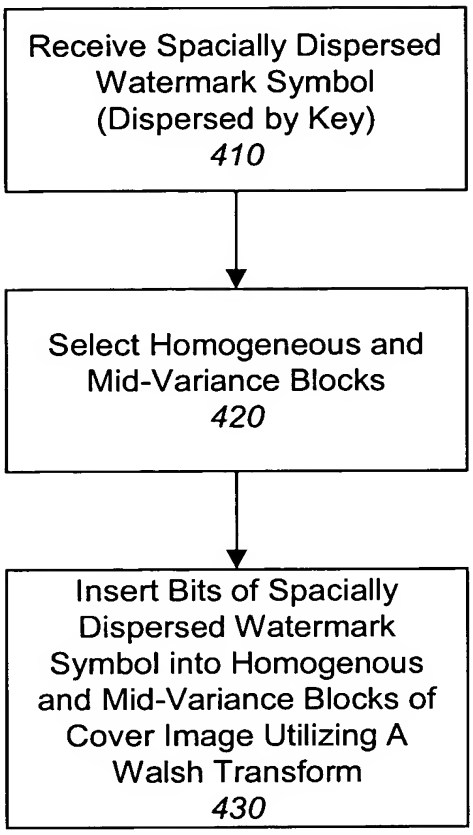
Receive Spacially Dispersed Watermark Symbol (Dispersed by Key)
410
Select Homogeneous and Mid-Variance Blocks
420
Insert Bits of Spacially Dispersed Watermark Symbol into Homogenous and Mid-Variance Blocks of Cover Image Utilizing A Walsh Transform
430

Figure 4

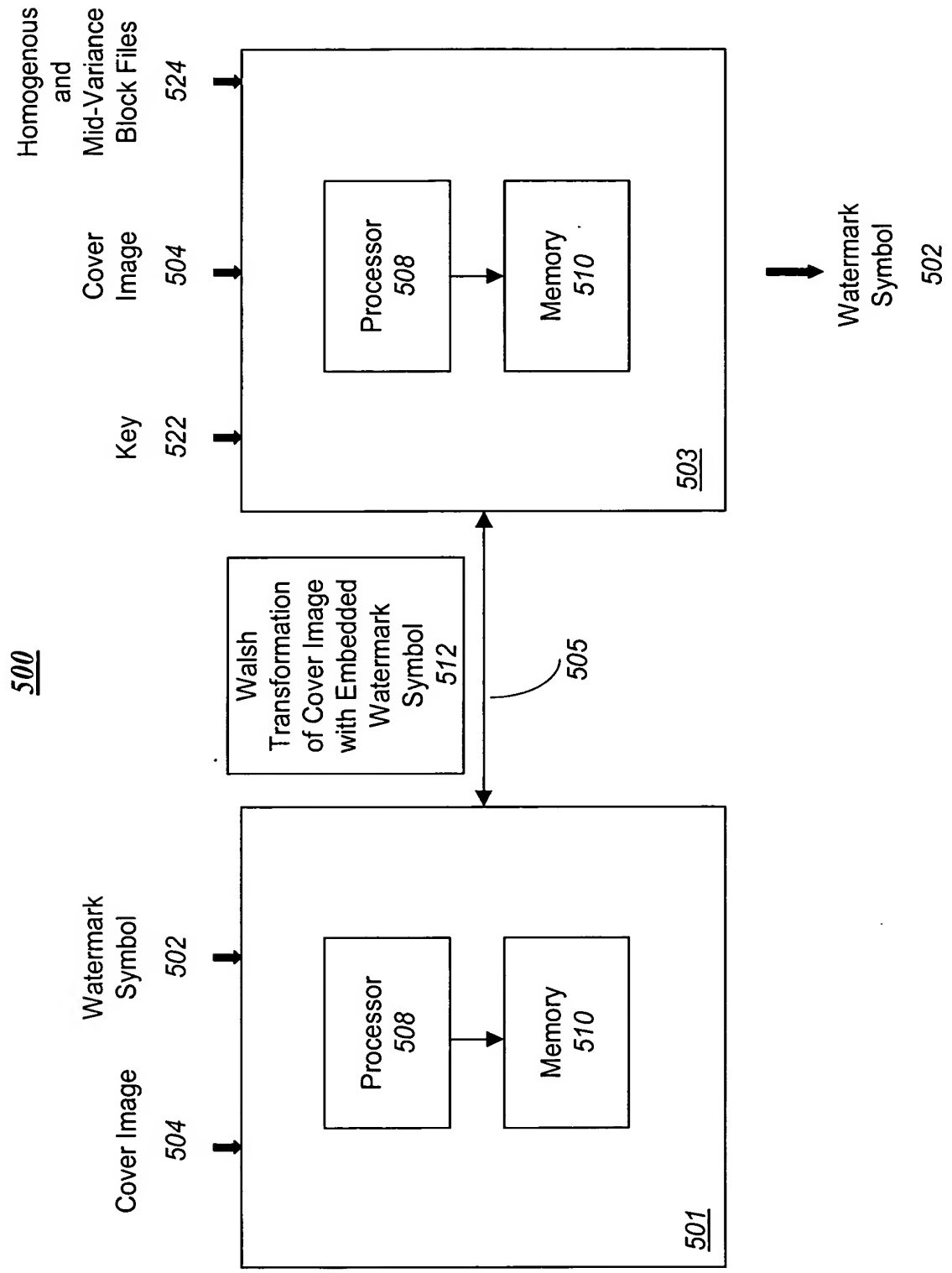
500
Cover Image 504
Watermark Symbol 502
Processor 508
Memory 510
501
Walsh Transformation of Cover Image with Embedded Watermark Symbol 512
505
Homogenous and Mid-Variance Block Files 524
Cover Image 504
Key 522
Processor 508
Memory 510
503
Watermark Symbol 502

Figure 5

Figure 6A

Figure 6B

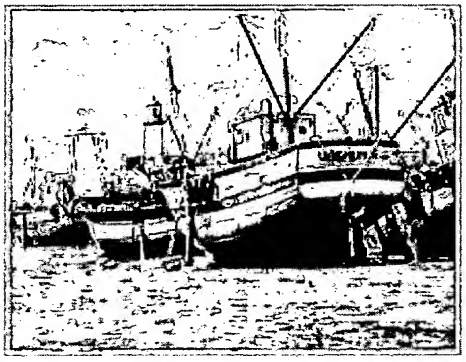

Figure 7A

Figure 7B

Figure 7C

Figure 6C

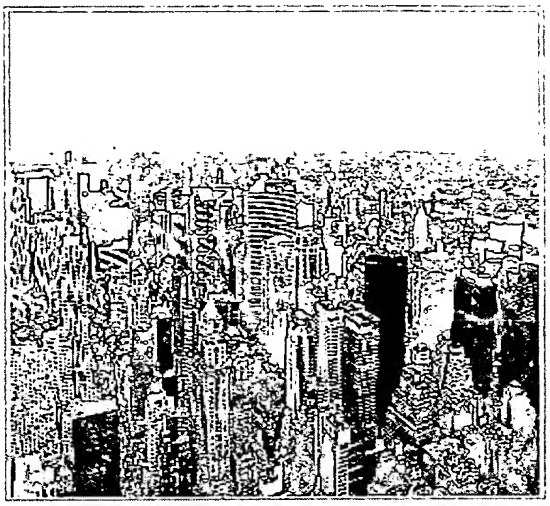

Figure 6D

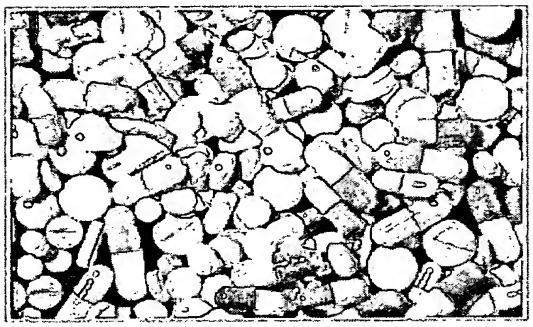

Figure 6G

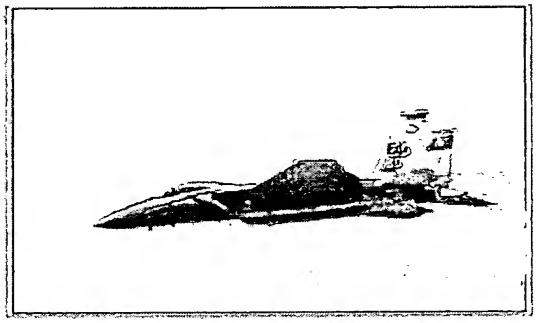

Figure 6F

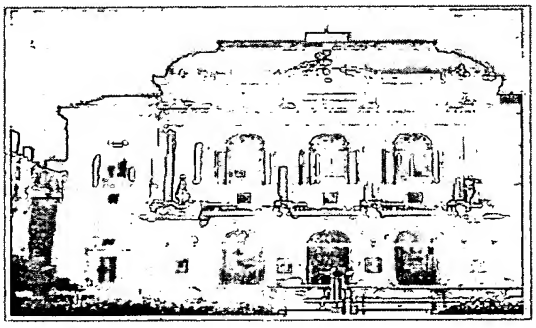

Figure 6E

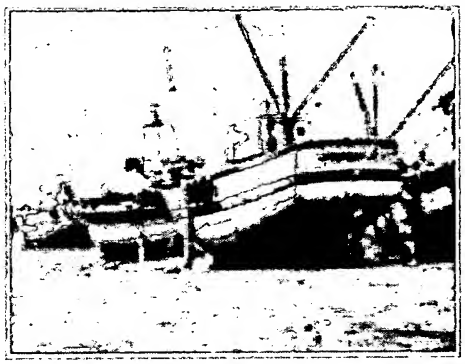

Figure 8A

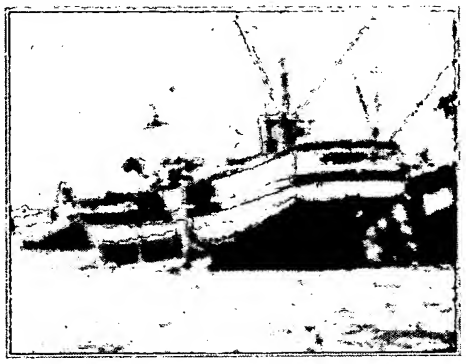

Figure 8B

Figure 9A

Figure 9B

Test image	Watermarked Image with PSNR (dB)	PSNR (dB) after 1st time mean filtering	Retrieved Logo with NCC value	PSNR (dB) after 2nd time mean filtering	Retrieved Logo with NCC value	PSNR (dB) after 3rd time mean filtering	Retrieved Logo with NCC value
Bear	34.33	27.77	Yes (0.988)	25.09	Yes (0.911)	23.81	No (0.64)
NewYork	30.40	19.79	Yes (1.00)	18.77	Yes (0.904)	18.33	No (0.31)
Opera	35.49	25.55	Yes (0.970)	24.18	Yes (0.89)	23.51	No (0.66)
F 151	41.67	33.27	Yes (0.994)	31.13	Yes (0.923)	29.98	No (0.56)
Pill	29.95	25.08	Yes (0.875)	22.68	Yes (0.762)	21.41	No (0.61)

Figure 10

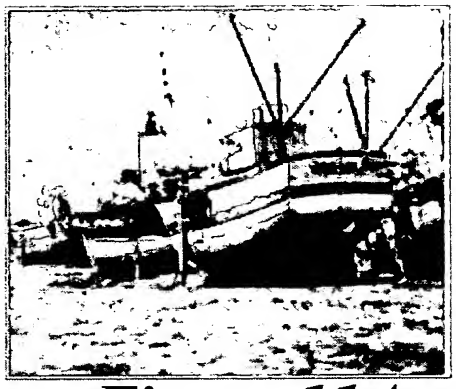

Figure 11A

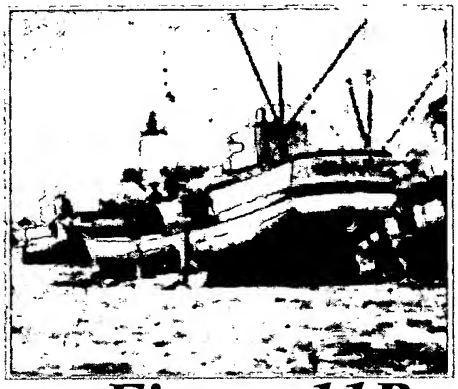

Figure 11B

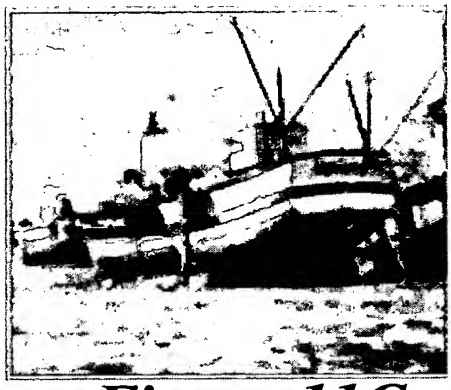

Figure 11C

Figure 12A

Figure 12B

Figure 12C

Test image	Watermarked Image with PSNR (dB)	PSNR (dB) after 1st time median filtering	Retrieved Logo with NCC value	PSNR (dB) after 2nd time median filtering	Retrieved Logo with NCC value	PSNR (dB) after 5th time median filtering	Retrieved Logo with NCC value
Bear	34.33	29.30	Yes (0.988)	28.17	Yes (0.988)	26.35	Yes (0.988)
NewYork	30.40	19.07	Yes (1.00)	19.57	Yes (1.00)	18.94	Yes (1.00)
Opera	35.49	25.24	Yes (0.952)	25.63	Yes (0.952)	24.89	Yes (0.934)
F 151	41.67	34.61	Yes (0.988)	34.27	Yes (0.952)	33.27	Yes (0.988)
Pill	29.95	28.76	Yes (0.940)	27.10	Yes (0.910)	25.31	Yes (0.92)

Figure 13

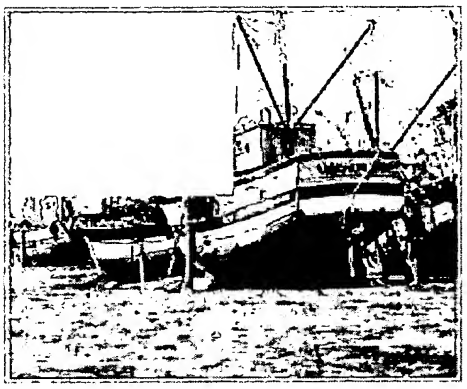

Figure 14A

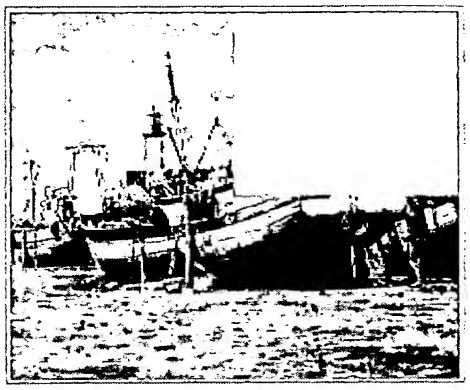

Figure 14B

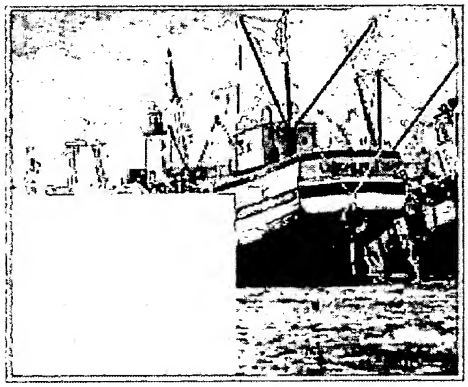

Figure 14C

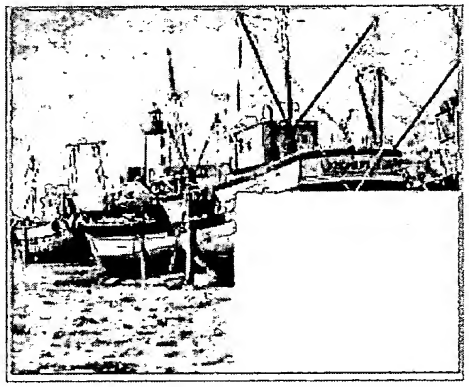

Figure 14D

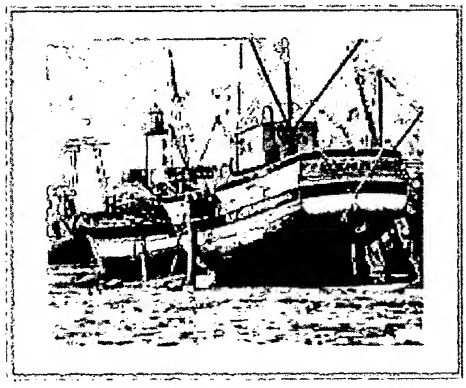

Figure 14E

Figure 15A

Figure 15B

Figure 15C

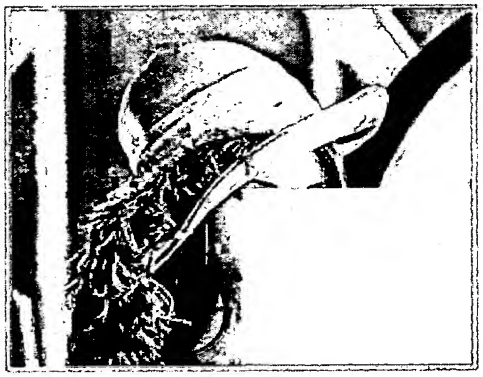

Figure 15D

Figure 15E

Test image	Upper-left PSN Value in dB	Retrieved Logo with NCC value	Upper-right PSNR value in dB	Retrieved Logo with NCC value	Lower left PSNR value in dB	Retrieved Logo with NCC value	Lower right PSNR value in dB	Retrieved Logo with NCC value	20 rows & columns PSNR in dB	Retrieved Logo with NCC value
Bear	15.47	Yes (0.95)	17.86	Yes (1.0)	14.97	Yes (0.96)	12.33	Yes (1.00)	14.25	Yes (0.98)
New York	15.27	Yes (0.82)	15.65	Yes (0.74)	17.88	Yes (1.0)	15.94	Yes (1.0)	14.75	Yes (0.69)
Opera	21.11	Yes (0.82)	21.48	Yes (0.64)	17.54	Yes (1.0)	20.03	Yes (1.0)	18.63	Yes (0.78)
F151	22.10	Yes (0.97)	23.27	Yes (0.99)	21.00	Yes (0.74)	19.57	Yes (1.0)	22.40	Yes (0.60)
Pill	17.79	Yes (0.84)	17.84	Yes (0.88)	17.92	Yes (0.88)	17.37	Yes (0.87)	16.77	Yes (0.83)

Figure 16

Test image	Watermarked Image with PSNR (dB)	PSNR(dB) and C.R. value	Retrieved Logo with NCC value	PSNR (dB) and C.R. value	Retrieved Logo with NCC value	PSNR(dB) and C.R. value	Retrieved Logo with NCC value
Bear	34.33	20.84(dB) 33.24	Yes (0.83)	20.57(dB) 36.82	Yes (0.81)	20.39(dB) 39.07	Yes (0.75)
New York	30.40	16.48(dB) 34.97	Yes (0.80)	16.21(dB) 39.93	Yes (0.80)	16.05(dB) 43.43	Yes (0.77)
Opera	35.49	18.51 (dB) 42.80	Yes (0.84)	18.38(dB) 47.01	Yes (0.63)	18.27(dB) 49.99	Yes (0.72)
F 151	41.67	18.07 (dB) 31.89	Yes (0.83)	18.06(dB) 44.32	Yes(0.79)	18.05 (dB) 52.13	No
Pill	29.95	17.24 (dB) 33.29	Yes (0.86)	17.06(dB) 37.37	Yes (0.86)	16.96 (dB) 39.60	Yes (0.87)

Figure 17A

Figure 18A

Figure 18B

Test image	Watermarked Image with PSNR (dB)	Inversion of LSB of all pixels; PSNR (dB)	Retrieved Logo with NCC value	Inversion of two LSB(s) of all pixels PSNR (dB)	Retrieved Logo with NCC value
Bear	34.33	48.06	Yes (0.95)	34.59	Yes (0.81)
New York	30.40	48.13	Yes (0.97)	34.32	Yes (0.69)
Opera	35.49	48.13	Yes (0.95)	34.92	Yes (0.74)
F 151	41.67	48.13	Yes (0.89)	34.81	No
Pill	29.95	33.08	Yes (0.95)	34.88	Yes (0.83)

Figure 19

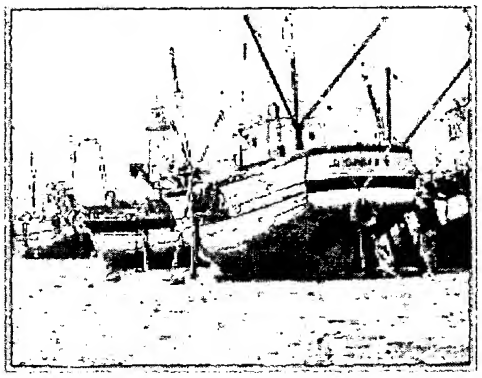

Figure 20

Figure 22A

Test image	Watermarked image gray level range PSNR (dB)	Change in gray level PSNR (dB)	Retrieved Logo with NCC value	Change in gray level PSNR (dB)	Retrieved Logo with NCC value	Change in gray level PSNR (dB)	Retrieved Logo with NCC value	Change in gray level PSNR (dB)	Retrieved Logo with NCC value
Fishing boat	255 – 1	200—50	Yes	255-50	Yes	200-1	Yes	200-100	No
	36.00	21.98	(0.92)	20.07	(0.93)	18.52	(0.93)	17.25	
Lena	243-22	200-50	Yes	243-50	Yes	200-22	Yes	255-0	No
	37.80	23.42	(0.74)	23.74	(0.87)	20.70	(0.83)	27.63	
Bear	253-0	200-50	Yes	255-0	Yes	253-50	Yes	200-100	No
	34.33	18.44	(0.83)	53.92	(0.94)	17.05	(0.91)	15.40	
New York	255-0	200-50	Yes	200-0	Yes	255-50	Yes	200-100	No*
	30.40	16.78	(0.95)	16.18	(0.98)	20.80	0.98	14.55	
Opera	255-22	200-50	Yes	255-50	Yes	200-22	Yes	255-0	No
	35.49	23.18	(0.97)	23.84	(0.98)	19.75	(0.99)	25.386	
F151	255-12	255-0	Yes	255-50	Yes	200-12	Yes	200-50	No
	41.67	30.84	(0.77)	21.61	(1.0)	19.82	(1.0)	25.87	
Pill	255-0	200-0	Yes	200-50	Yes	255-50	Yes	200-100	No
	29.95	18.34	(0.89)	19.96	(0.87)	19.35	(0.87)	15.30	

Figure 23

Figure 8C

Figure 8D

Figure 9C

Figure 9D

Figure 11D

Figure 11E

Figure 11F

Figure 12D

Figure 12E

Figure 12F

Figure 14F

Figure 14G

Figure 14H

Figure 14I

Figure 14J

Figure 15F

Figure 15G

Figure 15H

Figure 15I

Figure 15J

Figure 17B

Figure 17C

Figure 21

Figure 22B

Figure 18C

Figure 18D